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OTHER TRANSACTION AGREEMENT DTRS56-02-T-0001, SwRI® PROJECT 14.06162
"APPLICATION OF REMOTE-FIELD EDDY CURRENT (RFEC) TESTING TO INSPECTION OF UNPIGGABLE PIPELINES"

Many pipelines contain internal restrictions that do not allow the passage of inspection pigs that use conventional inspection technology. The purpose of this project is to investigate the feasibility of a remote-field eddy current (RFEC) inspection method that utilizes either a unique collapsible excitation coil or a small rigid excitation coil that can pass through internal pipeline restrictions.

Task 2, RFEC Coil Design, involves the modeling and design of RFEC coils to accommodate the size constraints imposed by internal restrictions. Concepts for a collapsible excitation coil were shown in the first status report. This is composed of six hinged segments, each consisting of an individual coil. Before proceeding with fabrication of this segmented coil, a single RFEC coil of conventional design (e.g., one coil of diameter slightly smaller than the inside diameter of the pipe) was designed and is being fabricated for use in a 12-inch-diameter pipe specimen. This coil will be configured with sensors and tested in the pipe specimen to provide a baseline RFEC response representative of a conventional RFEC system. This will prove the design of the coil windings and sensors and assure proper functioning of the RFEC system. The same coil winding parameters will then be used for the segmented coils. With this approach, the flaw responses of the segmented coil system can be directly compared to a conventional system.

An RFEC computer model developed previously by Southwest Research Institute (SwRI) was set up to study the RFEC flaw response for different coil and pipe parameters. The model showed that the use of a segmented coil instead of a conventional coil is expected to reduce the flaw response amplitude by only 10 percent. Based on the modeling results, the excitation coil winding parameters were finalized for the conventional coil design described above.

In Task 3, Breadboard System, a laboratory breadboard RFEC system will be designed and fabricated, and a test specimen will be prepared. The Technology Assessment (as reported in the first status report) showed that a collapsible RFEC system should address the pipe size range of approximately 4 to 22 inches diameter. Therefore, 12-inch-diameter pipe was selected for the RFEC test specimen as being a good target size within this range. A 20-foot-long piece of grade X-42, 0.375-inch-wall, seamless pipe was purchased for use as a test specimen. Simulated corrosion defects will be manufactured in the outside surface of the pipe by grinding in localized areas.

Support structure for the RFEC breadboard system was designed and fabricated. This includes coil forms for the sensors and for the conventional excitation coil and fixturing to position the coils in the test specimen. The excitation coil and sensor coils ride on rollers against the inside diameter of the pipe; the sensors are positioned on arms that are spring-loaded against the pipe surface. Additional arms are used to keep the assembly centered in the pipe.

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